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2  **Equation for Success:**

To Achieve The Governor's Proposed Demand Side Plan

Educate Electric Customers About Common-Sense, Proven, Practical Ways to Save Electricity and Reduce Demand

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Reasonable Financial Incentives (with full cost recovery)

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Creative, Intelligent Programs Delivered by Competent Professionals

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Happy Customers who Save Money (and appreciate the leadership assistance of those who are helping them maximize their opportunities to use electricity more efficiently and better manage their electricity costs)

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Comprehensive Energy Management Solutions

Since 1990, Chicago-based Sieben Energy Associates (SEA) has assisted its local, regional and national clients reduce their operating expenses through the efficient use and the cost-effective purchase of energy.

SEA assists organizations in developing and implementing energy cost management strategies.

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➤ **Strategic Energy Management**

- End-User Energy Strategy Development and Implementation
- Energy Management Outsourcing
- Environmental / Energy Strategy Consulting

➤ **Energy Commodity Management**

- Electricity and Natural Gas Supply Contract Negotiation in Restructuring Markets
- Rate Optimization in Regulated Markets
- Contract Administration and Market Monitoring Services
- Billing Analysis

➤ **Energy Efficiency Services**

- Energy Audits, Evaluation and Analysis of Buildings / Facilities
- LEED™ (Leadership in Energy and Environmental Design) Consulting
- Evaluation and Design of High Quality Lighting Systems for New and Existing Buildings
- Commissioning and Retro-Commissioning of New and Existing Buildings

➤ **Other Services**

- Renewable Energy and Sustainable Design Consulting
- Demand-Side Program Design and Implementation

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➤ **Demand Response / Energy Efficiency**

- Since 1990, audited energy use in hundreds of commercial, industrial and institutional facilities, reducing energy costs between 10% and 40% - identified many immediate no and low-cost savings opportunities as well as capital-related energy savings measures (facility sizes range from 50,000 sf to 2 million sf).
- Developed and delivered 5 MW demand response program to shopping centers, hotels and other commercial facilities, funded by California Energy Commission.
- Served as Program Manager for Community Energy Cooperative's Lighting Energy Management Program
 - Goal was to deliver 2.5 MW of lighting demand reduction, from April to December 2001. Program results were hurt by 9/11-related impacts.
 - Delivered 1.8 MW of lighting demand reduction to commercial and industrial customers in specific geographic areas of the ComEd service territory.
 - Customers received \$200/kW as an incentive to help buy down the cost of installing more energy efficient lighting.

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Relevant SEA Experience

➤ **Demand Response/Energy Efficiency**

- During the past five years, Illinois Clean Energy Community Foundation has offered Lighting grants for targeted facilities owned by government and non-profits, i.e. schools, libraries,

park districts, day care centers, universities and colleges. Available throughout Illinois.

- SEA has assisted numerous participants develop grant application, design retrofit solutions, manage process of selecting qualified vendors and manage installation.
- Applications are to retrofit existing lighting with energy efficient upgrades.
- The grant amount is based on the customers total demand load reduction (kW) (maximum grant amount has been ~ \$800/kW)
- To date, over 1600 buildings have been upgraded, resulting in the reduction of 37 MW in demand, grants have been ~ \$25 million.
- Further, 90 Illinois communities have upgraded 1700 intersections to use LED technology in traffic signals, resulting in 9 MW of load reduction, grants have been ~ \$3.7 million.

7 1960's to Present- What's in the Light Fixture has Changed: Anatomy and Evolution of a Fluorescent Lighting Retrofit in a Large Commercial Office Building

- **1960s:** Fluorescent "lay-in" fixtures have 4, 40w, T-12 (measuring 1-1/2" in diameter) fluorescent tubes (commonly known as "lamps"), acrylic lenses, and are powered by two ballasts (which transform the line voltage so the lamps can operate). Total fixture used about 200 watts. Light levels were high (no computers) – often 100 "footcandles" or above, light quality of fluorescent lamp was low ("rendered" true color at 60% (vs. daylight)).
- **1970s:** Energy becomes more topical, lighting product manufacturers start to offer a new wave of energy-saving products, offering 34w "energy saver" lamps, using less energy but also delivering less light (which was often okay). Also introduced "energy saver" ballasts, which improve upon previous design but similar to originals. Total fixture used about 160 watts. When light levels are deemed too high, customers simply "de-lamp" – unscrewing or removing two of the four fixtures in the 4-lamp fixture.
- **1980s:** Major advances in fluorescent lamp design, added "Tri-Color Phosphors" (i.e. color television technology) in the lamps that improved color rendering to 85% of natural light. Lamps got smaller – T-8 (measuring 1" in diameter). "Electronic" ballasts introduced, vastly improving way lamp was operated, eliminating lamp flicker and ballast "hum". Now three lamps can be used, and one ballast drives all three. Total fixtures uses ~ 80 watts (depending upon ballast type).

8 1960's to Present: What's in the Light Fixture has Changed

Also introduction of Compact Fluorescent Lamps (CFLs) enabling retrofit of incandescent bulbs to fluorescent lamps. 75 watt incandescent can be replaced with 18 watt fluorescent with similar light level.

- **1990s:** Computers saturate workplace, lighting level standards are now in 35 to 60 foot-candle range (vs. 100 to 150 in 1960s), new fixture designs offer direct or indirect lighting, and electronic ballasts start to take over new fixture OEM market. Ballasts can also be ordered with "dimming" features or able to respond to photocell controls to automatically adjust light levels.
- **2000s:** Further innovations in lamp and ballast designs allow T-8 / electronic ballasts to operate even more efficiently. Introduction of T-5 lamp (5/8" in diameter – tiny!) allows fixture designers to design higher-performance fixtures (can drive more light from fixture). Compact fluorescent lamps get better and better, both in design and color quality, more widely accepted.
- **WHAT'S NEXT:** LED technology to ultimately replace incandescent lamps and some fluorescents? Next ballast innovation making all fluorescent lamps "dimnable" so office workers have dimmer switches or controls to customize light levels. Lighting systems will "talk" with building automation systems more and more. Volatility of energy prices will drive innovations in lighting controls – see attached slides.

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